

## INTEGRATED EX ANTE ASSESSMENT OF AGRO-MANAGEMENT INNOVATIONS BY COMBINING CROP, FARM AND ADOPTION MODELS

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### Introduction

To increase the likelihood of adoption of innovative cropping systems by farmers, it is essential to design such systems according to the characteristics and leeway of each farm type (Joannon et al., 2005; Sterk, 2007). To date, *ex ante* assessment of innovation uses two approaches: i) the use of crop models and ii) the use of sociological or econometric methods. The first approach is sometimes combined with farm models and focuses on the biophysical performance of the innovation. However, it restricts farmer's behaviour to its economic dimension. The second approach allows capturing farmer's perception of innovation but with a lack of realism of the system's performance at field level. The objective of this paper is to present a new method that combines both approaches for an integrated *ex ante* assessment of different agro-management innovations and under various economic and policy conditions (e.g. evolution of banana price, EU subsidies, pesticides regulations), for the case of banana farming systems in French West Indies.

### The approach

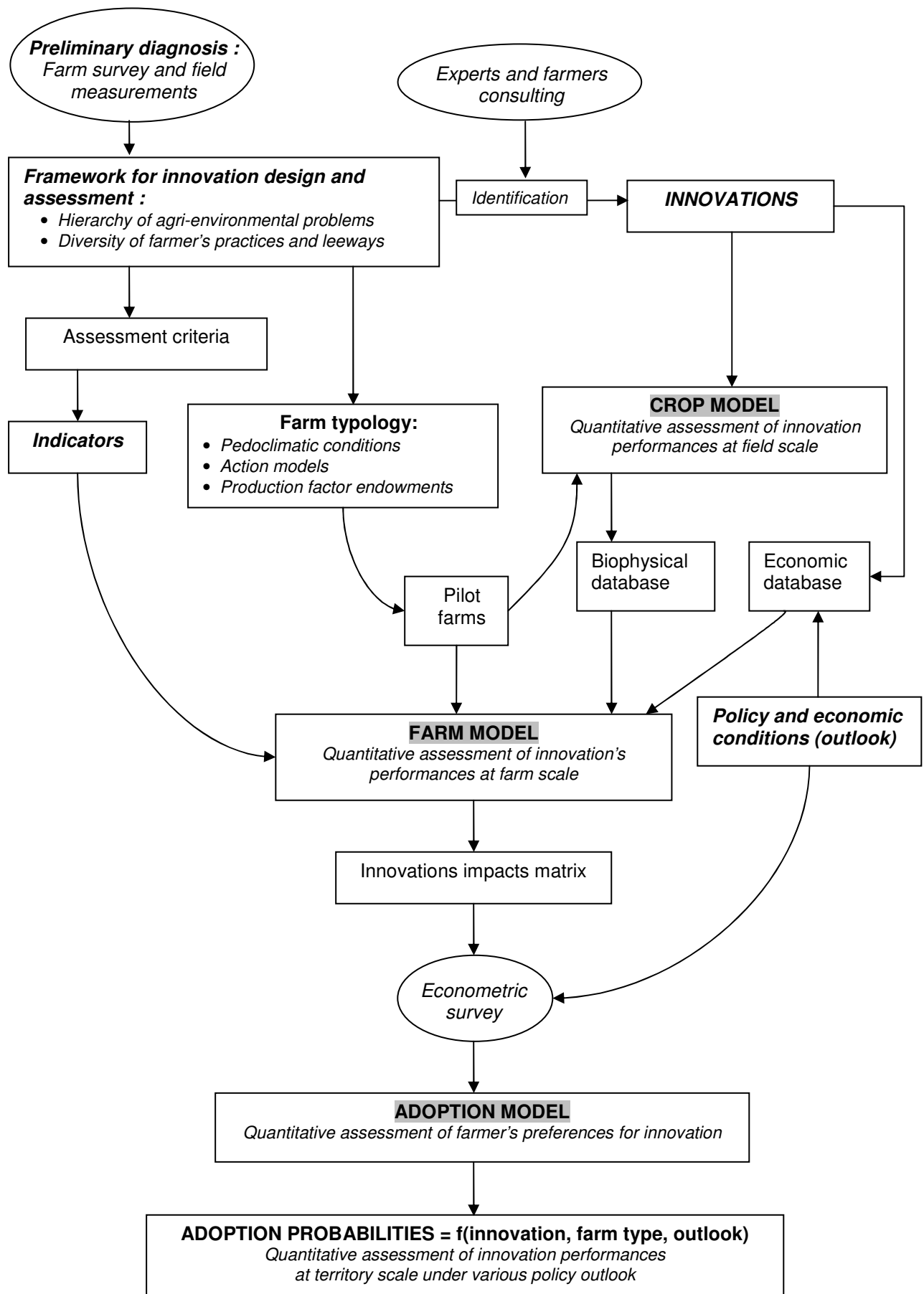
The approach developed is presented in figure 1. To enhance the relevance of innovations and their assessment criteria, they are selected after a preliminary diagnosis of farmer's main issues and crop management diversity, and with the involvement of experts and farmers. This analysis led to a wide range of possible innovations (e.g. rotations, intercropping, organic fertilization, Integrated Pest Management) and three types of evaluation criteria (farm income and costs, labor demand and seasonality and environmental impacts). A farm typology has been developed to model diversity at the territory scale in terms of crop management, pedoclimatic conditions, action models, and farm endowments. The crop model SIMBA was used to simulate the production and externalities of the banana-soil-nematodes system at the field scale (Tixier, 2007). Then, a farm bio-economic model, which included the farm typology, was used to compare both innovative and current cropping systems under real farm conditions. The overall result of this model was a series of indicators that combined results from several fields during several years. These simulations allowed simplified matrix of quantitative impacts of innovations adoption for each farm type, which are then used to develop an econometric adoption model by implementing an exhaustive farm survey (n=770) about farmer's preferences under different economic and policy outlooks. The adoption model, which is based on utility function maximization (Sidibé, 2005), yielded a probability of adoption for each innovative system as a function of farm and innovation characteristics.

### Conclusion

To increase the effectiveness of the innovation design, we assess the probability of adoption of each innovation by each type of farmer by combining three kinds of models never used together before to our knowledge. This approach can be useful for the design and adoption of sustainable farming systems and for agricultural policy making.

### References

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**Figure 1:** representation of tools and models chain for integrated *ex ante* assessment of innovation